

ABSTRACT

A ferritic stainless steel sheet containing 16.25 mass % of Cr and Ti and/or Nb at a ratio of $(C+N) \times 8$ or more is used as a substrate for formation of a hydrogen-permeating membrane exposed to a high-temperature atmosphere of 5 600-900°C, while another ferritic stainless steel sheet containing Cr up to 15 mass % is used as a substrate for formation of a hydrogen-permeating membrane exposed to a high-temperature atmosphere of 450-600°C. The stainless steel sheet is formed to a perforated body 3a with holes for passage of gas. A hydrogen-permeating membrane 3b is fixed to on an external surface of the perforated body 3a to build up a 10 hydrogen-separating pipe 3. A plurality of the hydrogen-separators 3 are inserted into a cavity between inner and outer walls of a double-pipe 2 filled with a catalyst 4. Hydrocarbon gas fed through a nozzle 7 is decomposed with combustion heat of a fuel F fed into an inner space of the double-pipe 2. A decomposition product H₂ selectively permeates through the membrane 3b and flows out through the takeout opening 8.